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SCIENTIFIC POSTERS

Gastrointestinal

1. Recurrent colorectal cancer: a pictorial review

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There is wide variability in the methods of follow up of patients with colorectal cancer. For the majority of patients follow up comprises regular clinical assessment and measurement of carcinoembryonic antigen (CEA) with interval colonoscopy. Regular CT examinations will additionally detect distant disease such as liver and pulmonary metastases as well as local recurrence. With this in mind we highlight the importance of detecting recurrent colorectal cancer using both CT and MRI. Particular attention is given to the detection of surgically resectable disease as there is now increasing evidence that improvements in survival are achieved by aggressive surgical removal of such recurrences. We also use CT and MRI to illustrate the importance of pelvic relapse as a common clinical endpoint in rectal cancer and discuss the role of [^{18}F]2-fluoro-2-deoxyglucose (FDG)-positron emission tomography (PET) in this subgroup of patients. We discuss the emerging role of endorectal ultrasound (ERUS)-directed biopsy in detecting early recurrence of rectal cancer, particularly in those patients at higher risk of recurrence.

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2. FDG PET/CT in thoracic oesophageal and oesophago-gastric junction carcinoma: current status pictorial review

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Integrated positron emission tomography/computed tomography (PET/CT) with ^{18}F-labelled fluoro-2-deoxy-D-glucose (FDG) is emerging as a powerful technique for the assessment of patients with thoracic oesophageal and oesophago-gastric junction carcinomas. FDG PET/CT in staging cancers may identify primary tumours along with locoregional nodes and detect distant metastases. Using serial studies the response to neo-adjuvant treatment may be monitored. FDG PET/CT may detect recurrent disease. The limitations of FDG PET/CT include pitfalls such as physiological oesophagogastric junction FDG uptake and non-neoplastic inflammatory/infectious causes of FDG accumulation in the oesophagus and at the oesophago-gastric junction. Integrated FDG PET/CT may have a role in the detection of severe dysplasia associated with Barrett's oesophagus. The standardized uptake value (SUV) can be used to aid determination of the significance of areas FDG uptake and provides a method of quantification in serial studies. Other investigations remain integral in the assessment of patients with thoracic oesophageal and oesophago-gastric junction carcinomas. Endoscopy and biopsy of suspicious areas is the cornerstone for establishing the diagnosis of upper gastro-intestinal tract malignancies. Small volume primary disease is not reliably detected on FDG PET/CT. In staging disease, endoscopic ultrasound remains the method of choice for assessing the primary site and adjacent para-oesophageal nodes. The most comprehensive non-invasive tool for detecting distant metastases is integrated PET/CT; its utilization can lead to more appropriate selection of patients for surgical resection. In this pictorial review we aim to use illustrative cases to summarize the role of FDG PET/CT in assessing patients with thoracic oesophageal and oesophago-gastric junction carcinomas.

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3. Accuracy of MRI in prediction of circumferential resection margin involvement in patients with rectal cancer

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The aim of surgery in rectal cancer is to achieve a disease free circumferential resection margin (CRM). In our institution, MRI is used to stage rectal cancers pre-operatively. The aim is to identify those patients at risk of having an involved CRM at the time of surgery. Those who have no disease encroaching on the CRM proceed directly to surgery. Those with locally advanced cancers receive chemoradiation prior to surgery. They are subsequently re-staged with MRI. The aim of this study is to compare the accuracy of MRI for CRM prediction in these two groups of patients. Sixty-three patients with rectal cancer were studied retrospectively. Thirty-three patients proceeded directly to surgery. In 31 (94%) of these, MRI correctly predicted CRM status. Thirty patients underwent chemoradiation and repeat MRI prior to surgery. MRI correctly predicted CRM status in 21 (70%). In nine cases MRI predicted an involved CRM which was clear at resection (positive predictive value 47%). No patients were predicted to have a clear CRM by MRI which turned out to be involved at resection (negative predictive value 100%). Six patients were felt to have increased or unchanged tumour bulk. In these cases there was 100% agreement between MRI and pathology. MRI correlates well with pathology in patients who have not received chemoradiation. However, accuracy of MRI for prediction of CRM status is significantly reduced after chemoradiation. MRI tends to over stage CRM involvement in this situation.

Genito-urinary

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4. Assessment of diagnostic value of multiphase enhanced fast GRE in patients with prostate adenocarcinoma

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Aim: Comparison of the localisation of enhancement areas and areas of highest metabolites ratio; correlation of the results with histopathologic examination.

Materials and methods: Twenty-one patients with prostate adenocarcinoma examined with magnetic resonance imaging (MRI) before prostatectomy. The MRI protocol was: TSE-xL/90 ax, sag, SE T1, whole pelvis ax, FSE-xL/90 ax, sag, MRS 3D with endorectal coil, multiphase enhanced fast GRE 3D; contrast dose, 0.2 ml/kgcc; speed, 2 ml/s; delay, 20 s. The colour map of the maximum slope of increase (MSI) and the time intensity curves in the region of the highest MSI in multiphase enhanced fast GRE sequence were compared with the areas of highest metabolites ratio Ch+Cr/Ci (CC/Ci) in MRS and correlated with the histopathologic result.

Results: The contrast enhancement of highest CC/Ci areas was detected in 17 (81%) patients, lack of enhancement in 4 (19%) patients. In 2 (10%) cases there was no correlation between MSI and CC/Ci, while the MSI result correlated more strongly with the histopathology. Overall, the MSI result corresponded to the histopathology in 19 (90%) cases. In the MSI region the enhancement was visible earliest and was the most intense in comparison to the enhancement in the benign prostatic hyperplasia foci.

Conclusions: The multiphase enhanced fast GRE sequence can improve the assessment of cancer foci localisation in MRS in patients with prostate adenocarcinoma.

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5. Growing teratoma syndrome: the CT appearances

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Purpose/methods: Treatment of metastasis from non-seminomatous germ cell tumours of the testes is by chemotherapy and response is monitored by serum tumour marker levels and computer tomography (CT) scans. Growth of a lesion despite normal levels of serum tumour markers represents the growing teratoma syndrome. We present the retrospective imaging of seven patients, the largest series to date with growing teratoma syndrome.

Results: All patients had retroperitoneal spread. Two patients had mediastinal and pulmonary parenchymal disease. The masses were either solid, cystic or mixed. Two cystic masses, one retroperitoneal and one mediastinal, had thick enhancing walls, the other masses had thin walls. Five patients showed compression and displacement of the inferior vena cava, one had obstruction of the left ureter and one had compression and displacement of the bowel and psoas muscle. In the chest, compression of the left brachial plexus and of branches of the right pulmonary artery was seen. All patients underwent surgical removal of their masses. There was one intraoperative death; all other patients are currently disease free.

Conclusion: Growth of residual masses following surveillance scans of patients treated for non-seminomatous germ cell tumours with normal serum tumour markers should make the radiologist raise the diagnosis of the growing teratoma syndrome. Following diagnosis these tumours need to be treated by complete surgical resection to prevent encroachment on vital structures and prevent the possibility of dedifferentiation into a more aggressive tumour.

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6. MRI appearances with histopathological correlation in adenocarcinomas of the cervix

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Aim: To describe the spectrum of MRI appearances of adenocarcinomas of the cervix. To correlate magnetic resonance imaging (MRI) and histopathological features. To emphasise the pitfalls and difficulties in staging adenocarcinomas and suggested improvements in MRI techniques.

Content organisation: MRI of 45 patients with histologically confirmed adenocarcinoma of the cervix was retrospectively reviewed. Thirty-six patients had radical hysterectomy and correlation of MRI and surgical specimen was performed. Nine patients had disease stage IIB or higher with follow-up MRI. For each tumour, site, size, proximal extension, parametrial invasion and nodal metastases on MRI and pathology were documented and compared. Common appearances and errors in MR staging and pitfalls are demonstrated.

Conclusions: Cervical adenocarcinomas are infiltrative tumours that commonly present with atypical MRI features of cervical cancer. Their patterns of disease, particularly endometrial and parametrial extension and early nodal metastatic involvement are particular pitfalls and these will be demonstrated with surgical correlation.

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7. MRI appearances of unusual cervical neoplasms

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Carcinoma of the cervix is the third commonest gynaecological malignancy worldwide. In the United Kingdom 3000 women are diagnosed with cervical cancer each year. Squamous and adenocarcinoma are the commonest pathological subtypes and constitute more than 95% of cervical carcinomas. Unusual cervical neoplasms, although rare, constitute an important subtype. These subtypes include adenoma malignum, glassy cell carcinoma, carcinoid/small cell carcinoma, melanoma, metastasis, lymphoma, rhabdomyosarcoma and mixed Mullerian sarcoma. Although histological confirmation is always required, some of these neoplasms have characteristic imaging features that may suggest the diagnosis. A pictorial review of the magnetic resonance appearance along with histological correlation will be performed. A detailed discussion of the various unusual histological subtypes will be undertaken.

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8. Ovarian carcinoma: a pictorial review of the use of FDG PET/CT

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^{18}F-Labelled fluoro-2-deoxy-D-glucose positron emission tomography (FDG PET) and integrated FDG PET/computed tomography (FDG PET/CT) have many established roles in the management of a number of malignancies. There are few large studies regarding the use of FDG PET in gynaecological malignancy, but the relatively recent development of integrated PET/CT is resulting in its increased use in assessing cases of ovarian carcinoma. Combined scanners can help localise pathological activity and differentiate it from physiological radiotracer uptake. FDG PET/CT has little role in the evaluation of primary ovarian masses; ovarian uptake maybe seen in a wide range of benign conditions as well as malignancy. In assessing volume of disease in patients being considered for surgery FDG PET/CT may aid decisions about extent of debulking. FDG PET/CT can monitor response to treatment in patients undergoing chemo radiotherapy; distribution of uptake and the standardised uptake value (SUV) can be assessed on serial studies. In cases of suspected recurrence with plateaued or rising serum CA-125 levels and normal or equivocal conventional cross-sectional imaging FDG PET/CT may identify foci of disease. False negative studies can occur in diffuse peritoneal carcinomatosis; sensitivity is lowest in the pelvis. FDG PET/CT is more sensitive for lymph node metastases than peritoneal metastases. Using illustrative cases we aim to discuss the evolving potential uses of combined FDG PET/CT in the management of ovarian cancer.

Liver

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9. Detection of liver metastases with MDCT: comparison of three slice thicknesses

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Aim: The purpose of our study was to compare the effectiveness of 3.2, 5 and 7.5 mm slice thicknesses in the detection and characterisation of liver lesions found on computed tomography (CT) in patients with known or suspected malignant disease.

Methods: One-hundred and ten patients underwent portal phase imaging using four-slice multidetector CT (MDCT). Two blinded observers independently read hard copy images at each slice thickness. The size and location of each lesion detected was recorded by each observer on a diagram of liver segmental anatomy. Each lesion was characterised as benign, malignant or indeterminate in nature. A diagnostic confidence score was allocated for each lesion on a scale of 1–4. The pathology or behaviour of lesions was assessed using surgery with intra-operative ultrasound and histology, or interval imaging with magnetic resonance imaging, CT, or sonography.

Results: Two-hundred and ninety-four lesions were detected, 64 (22%) of which were malignant. Both observers detected significantly more lesions on the 3.2 mm vs. 7.5 mm slice thickness ($p < 0.0001$). Both observers detected more malignant lesions on 3.2 mm than on 7.5 mm slice thickness, but the difference in sensitivities was significant by McNemar test only for observer one (two-tailed $p < 0.01$). As slice thickness decreased, the proportion of lesions characterised as indeterminate by both observers fell significantly ($p < 0.05$).

Conclusion: The majority of liver lesions detected were benign. Using thinner slices allowed both more lesions to be detected and characterised. Sensitivity for the detection and correct characterisation of malignant lesions was optimal on 3.2 mm slices for observer one and equally good on 3.2 and 5 mm slices for observer two.

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10. The emerging role of percutaneous radiofrequency ablation in the treatment of hepatocellular carcinoma (HCC)

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Aim: Hepatocellular carcinoma is the commonest primary hepatic malignancy worldwide, with a poor prognosis if untreated. Treatment modalities include: surgical, local ablation, systemic chemotherapy and immunotherapy, with long-term survival best in those patients undergoing liver transplantation. Radiofrequency ablation (RFA) is a commonly used local therapy that we have begun to incorporate into the treatment algorithm for HCC in our institution. This study examines the role of percutaneous RFA at a supraregional hepatobiliary and liver transplant centre.

Method: We report a single centre, retrospective review of patients with HCC who underwent percutaneous RFA between August 2003 and December 2005. Patients were identified from an HCC database and their imaging and medical records were examined. Data regarding demographics, liver disease diagnosis, tumour size and number, treatment episodes, complications, survival and other therapies were evaluated. RFA procedures and subsequent imaging review was carried out by three experienced hepatobiliary radiologists.

Results: Over the study period 27 patients received 30 treatment episodes of RFA for HCC (19 male; 8 female). The average patient age was 67 years (SD $\pm$ 11). The average lesion size was 2.6 cm (SD $\pm$ 1.6) with only one major complication (intra-peritoneal bleeding). At 6 weeks there was a good response to treatment in 47% of patients.

Conclusion: RFA is a safe and effective treatment in selected patients with HCC. Long-term follow up is required to determine the duration of treatment response and its impact on quality of life and survival.

Abdomen

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11. Imaging of neuro-endocrine tumours using iodine-123 MIBG: a pictorial review

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The role of iodine-123 labelled meta-iodo-benzyl-guanidine (MIBG) scanning in the evaluation of tumours of neural crest origin is well established. MIBG scanning is particularly useful in localising, staging and follow-up of tumours arising from the sympathetic nervous system, including phaeochromocytoma, paraganglioma and neuroblastoma. Less well recognised are its merits in the management of other neuro-endocrine tumours such as carcinoid tumours and medullary carcinoma of thyroid. Furthermore, MIBG scanning can identify patients suitable for radiolabelled MIBG therapy. In our institution, which is an oncology tertiary referral centre, approximately 25 MIBG scans are performed per annum. In this pictorial review, a number of clinical cases will be discussed, illustrating a range of pathological MIBG studies, with correlative cross-sectional imaging, biochemical and clinical data.

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12. MIBG scanning in the evaluation of neuro-endocrine tumours: optimisation of imaging

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The role of iodine-123 labelled meta-iodo-benzyl-guanidine (MIBG) scanning is well established in the localisation, staging and follow-up of neuro-endocrine tumours especially those arising from the sympathetic nervous system, such as phaeochromocytomas and paragangliomas. Despite the merits of MIBG scanning, diagnostic problems are frequently encountered for a range of reasons including, artefacts, poor lesion/background activity ratio, non-specific activity and renal excretion. Optimisation of the imaging protocol and techniques to overcome these problems will be discussed with particular reference to: patient preparation; multiple time points of image acquisition; use of single photon emission computed tomography (SPECT); co-administration of MAG3 to differentiate renal and adrenal activity; image processing, e.g. subtraction of noise from high energy photons. Clinical examples from our institution, which is an oncology tertiary referral centre, performing approximately 25 MIBG scans per year, will be shown to illustrate normal MIBG biodistribution and diagnostic pitfalls.

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15. Inoperable and recurrent retroperitoneal liposarcomas: patterns of disease on CT

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Aim: To determine the patterns of disease in patients with inoperable or recurrent retroperitoneal liposarcoma.

Methods: Twenty-one consecutive patients with retroperitoneal liposarcoma were identified from clinical and radiological databases at our tertiary oncology centre. Computed tomography (CT) imaging was retrospectively reviewed for all cases.

Results: There were 12 (57.1%) males. The median age at first imaging was 53.8 (27.7–76.9) years. Sixteen (76.2%) patients had undergone previous surgery; in 10 of these patients (62.5%) resection was described as complete. CT examinations from all 21 patients were reviewed. Of the 16 patients previously treated with surgery, 13 (81.3%) were found to have residual or recurrent tumour on CT. In eight patients (61.5%), tumour was present in the retroperitoneum alone and in five patients (38.5%) tumour was seen in both the retroperitoneum and abdominal cavity. Retroperitoneal recurrences were of mixed fat and soft tissue density. Larger retroperitoneal recurrences displaced adjacent structures and occasionally protruded into the peritoneal cavity. Early recurrence of tumour was seen as a subtle local increase in fat or as small soft tissue nodules. These were often overlooked on initial reporting. Five patients (23.8%) were referred with inoperable disease and no previous surgery. Four of these patients were treated with chemotherapy but all progressed.

Conclusion: Most tumours were large with marked mass effect. Early recurrence may be subtle with increase in fat volume or new nodules and can be easily overlooked. Early diagnosis of recurrence on CT may allow salvage surgery.

Musculoskeletal

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16. MRI of musculoskeletal soft tissue sarcomas: a pictorial review of imaging characteristics

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Magnetic resonance imaging (MRI) is the best imaging study for the evaluation of muskuloskeletal soft tissue neoplasm. MRI is used both for tissue characterization and local staging of soft tissue sarcomas. The multiplanar imaging capacity and soft tissue differentiation provided by MRI makes it ideal for the evaluation of these lesions. This poster reviews the imaging characteristics of many histologic subtypes of soft tissue sarcoma including malignant fibrous histiocytoma, liposarcoma, malignant peripheral nerve sheath tumors, and synovail cell sarcoma. Other rare soft tissue malignancies are also discussed. The important factors in soft tissue tumor staging are also reviewed. The radiologist must evaluate each lesion for neurovascular involvement, articular extension, osseous invasion, and regional metastasis. Benign lesions tend to be small, superficial and homogenous while malignant lesions tend to be large, deep and heterogeneous. There is, however, a broad spectrum of overlap in the imaging features of benign and malignant soft tissue tumors. Although in most cases MRI can confidently differentiate benign from malignant neoplasm, MRI not infrequently is able to definitively characterize some lesions. Benign lesions with a characteristic imaging appearance (lipoma, hemangioma, shwannoma, fibromatosis, giant cell tumor of tendon sheath, pigmented villonodular synovitis) are reviewed.

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13. Imaging appearances with clinical and biochemical correlation in Islet cell tumours of the pancreas

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Aim: To demonstrate the range of appearances of islet cell tumours of the pancreas (ICP) on computed tomography (CT), magnetic resonance imaging (MRI) and octreotide imaging. To assess the performance of each imaging modality and correlate imaging findings with clinical, biochemical and histopathological results.

Content organization: Imaging of 50 patients with 56 tumours (sporadic and syndrome associated, benign and malignant) was retrospectively reviewed. Number of tumours, size, site, metastatic disease, CT enhancement, MRI signal characteristics and octreotide positivity was documented. Clinical presentation, biochemical data (serum insulin, somatostatin, glucagon, gastrin and urine 5HIAA) was correlated for each patient. Sensitivity, specificity and accuracy of each modality for tumour detection were calculated.

Conclusion/summary: Our study is the largest cohort of islet cell tumours studied to date and will be the first to correlate the range of clinical and imaging patterns in ICP. We propose an imaging algorithm based on biochemical and clinical manifestations.

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14. Multi-parametric MRI in support of antiangiogenesis and vascular targeting clinical drug trials

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Gadolinium-diethylenetriamine penta-acetic acid (Gd-DTPA)-enhanced magnetic resonance imaging (MRI) has developed from an aid to morphological imaging of cancer to functional dynamic T_1 weighted or T_{2*} weighted dynamic scanning. Additionally, blood oxygenation level dependent (BOLD) and diffusion-weighted imaging (DWI) can be performed, all of which can yield parametric images that reflect different aspects of the tumour microenvironment. All can be performed in a one hour-long scanning session which is short enough to be acceptable to patients. BOLD imaging uses a sequence sensitive to small paramagnetic changes, e.g. GRE/FLASH (TE 5–60 ms, TR 105 ms, $\alpha = 40°$, 8 mm slices), or echo planar imaging (EPI). Diffusion uses single or multi-shot EPI sequences, minimising the echo time and using multiple b values. Our two-point method for acquiring quantitative images (K^{trans}, k_{ep}, v_e) from T_1 weighted dynamic scanning involves a proton density weighted sequence (TE 4.7 ms, TR 350 ms, $\alpha = 35°$, 3 × 8 mm slices) being performed before 40 T_1 weighted scans (typically 3 × 8 mm slices: TE 4.7 ms, TR 11 ms, $\alpha = 35°$). A T_{2*} weighted sequence, e.g. GRE/FLASH (TE 20 ms, TR 30 ms, $\alpha = 40°$) with time resolution <2 s images tumour blood flow and volume. Tissue R_{2*} ($=1/T_{2*}$) is calculated by fitting an exponential curve to the BOLD data. Diffusion maps are calculated using the scanner's software. Our T_1 and T_{2*}-weighted dynamic data are processed using MRIW software, (ICR, London). Advanced imaging techniques for quantitative MRI together with user-friendly analysis programs yield parametric images which can provide both morphological and functional images of tumours. These images can be used for diagnostic purposes, but also for assessing treatment response to a new generation of anticancer drugs including antiangiogenesis and vascular targeting agents.

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17. Radiologic–pathologic correlations in soft tissue liposarcomas of the extremity

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Purpose/introduction: To give an accurate presentation of ultrasound (US), computed tomography (CT) and magnetic resonance imaging (MRI) findings in soft tissue liposarcoma of the extremity, with pathologic correlations after surgery.

Materials and methods: Liposarcoma is the second most common type of soft tissue sarcoma (10%–35%). Its histologic subtypes are categorized as: well differentiated, dedifferentiated, myxoid, pleomorphic and mixed type. Patients were evaluated with US, CT and MRI.

Results: The lesions are identified with relative ease on CT and MRI, due to the typical density/signal of the fatty areas of the liposarcoma. In these cases, the non-fat areas, on which to direct the biopsy, are picked up with imaging. Special attention should be focussed on the density/signal intensity in tumoral nodules and septae. Myxoid liposarcomas have some peculiarities such as intramuscular position, pseudocystic aspect with peripheral enhancement, small solid nodules, or septa containing fat.

Discussion/conclusion: Knowledge of the anatomo-pathological and anatomo-surgical substrate of lipomasacromatous tumors of the extremity soft tissues constitutes the basis for diagnostic imaging assessment and is fundamental for optimal patient management.

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18. Skeletal and extraskeletal chondrosarcomas: spectrum of imaging findings in eight surgically proven cases

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Chondrosarcomas are malignant tumours of the musculoskeletal system which characteristically produce a cartilage matrix. These tumours arise spontaneously within the bones or soft tissues (primary chondrosarcoma) or from pre-existing enchondromas or osteochondromas. Primary bone chondrosarcoma is a relatively common neoplasm, accounting for up to 27% of all primary bone malignancies; there are however numerous subtypes which occur with varying frequency. Conventional intramedullary chondrosarcoma accounts for over 60% of these tumours while extraskeletal chondrosarcomas are responsible for only 2% of all soft tissue sarcomas. Other recognised subtypes of primary chondrosarcoma include juxtacortical, dedifferentiated, clear cell, mesenchymal and myxoid. The aim of our presentation is to illustrate varied radiological appearances of these tumours. The clinical notes and radiological findings of eight surgically proven cases of chondrosarcoma consisting of five skeletal and three extraskeletal tumours were reviewed. Seven cases of primary chondrosarcomas with a single case of sarcoma arising from an osteochondroma were identified. Plain film and computed tomography (CT) findings of enchondral ossification ranged from large bizarre and poorly demarcated mineralization expected in a malignant tumour to finer well defined calcification more commonly associated with benign chondroid lesions. Non-calcified tumours were also noted. Cross-sectional imaging demonstrated tumours with a lobular appearance associated with central low attenuation on CT and high signal on T2-weighted magnetic resonance (MR) sequences reflecting their high water content. The pattern of MR contrast enhancement was predominantly peripheral and septal in nature. Awareness of the spectrum of imaging findings in chondrosarcoma will allow for accurate diagnosis, staging and surgical planning for these malignant tumours.

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19. CT appearances of bone lesions detected on PET/CT

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Our objective was to review the computed tomography (CT) appearances of bone lesions detected on positron emission tomography (PET)/CT images, and to assess our initial experience of how many PET detected bone lesions were visible on our CT images. It has previously been found that only half of metastatic bone lesions detected on PET imaging are visible on CT scanning, having implications for both accurate prognosis and for suitability for surgery. Our PET/CT images were independently reported by three consultant radiologists, all with dual accreditation in nuclear medicine. We retrospectively reviewed the CT images of bone lesions detected on PET scanning, and present a comprehensive pictorial review of 19 patients with a variety of imaging appearances of bone metastases.

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20. CT and MRI findings in skeletal muscle metastasis

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Introduction: Between the anatomic structures the skeletal muscles are less frequently involved in metastatic lesions but the real incidence is difficult to determine because they are not always adequately investigated. Our objective is to describe computed tomography (CT) and magnetic resonance (MR) findings of metastasis of different origin involving various muscles of the skeleton.

Materials and methods: Thirteen patients with histologically proven muscular metastatic lesions (four from melanoma, three from colorectal carcinoma, three from lung cancer, two from breast cancer, one from urothelial cancer) were studied with helical CT (Tomoscan SR 700 Philips) after i.v. iodine contrast medium. Eight were studied with MRI (SE T1-W, T2-W and contrast enhanced T1-W) on a 1.5 T unit (Siemens).

Results: Muscles adjacent to the trunk such as paraspinal, iliopsoas, iliacs and gluteous are more commonly involved. In three cases metastatic involvement was observed in patients with clinically silent muscular disease and this evidence casts doubt on the real frequency of these hematogenous metastases.

Conclusions: CT and MR allowed good definition of muscular metastatic lesions. MR, better than CT, determines the anatomic location, the extension of lesions and it provides a better tissue characterization.

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21. CT and MR imaging features of primary soft tissue lymphomas distinguishing them from sarcomas

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The most common malignant soft tissue mass is a soft tissue sarcoma, but as a group, soft tissue sarcomas represent less than 1% of all malignancies. In contrast, lymphoma is over ten times more common a malignancy than soft tissue sarcoma, but lymphoma as a cause of a malignant soft tissue mass is rare, and primary soft tissue lymphoma accounts for only 0.11% of all malignant lymphomas. Differentiation between the two malignancies is of critical importance with respect to management and prognosis, soft tissue sarcomas being treated primarily by radical surgical excision and radiotherapy, often sacrificing a degree of function to achieve tumour clearance, whereas lymphomas are treated with chemoradiotherapy, often with a good outcome. Nearly all the previously reported cases of lymphomas presenting as soft tissue masses are in the pathology or surgical literature, and few reports define the clinical and radiological features of this condition. We describe a series of ten cases of lymphoma presenting as soft tissue masses to the sarcoma unit at our institution over a 2-year period. We illustrate key computed tomography and magnetic resonance imaging features such as regional lymph node involvement, the disruption of fascial planes and the infiltrative pattern of muscle involvement, with histopathological correlation, to distinguish the two conditions. We emphasise that even with advances in imaging technology the definitive diagnosis must be made by excision biopsy.

Audit

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22. Proportion of images available for radiological review prior to cancer MDT meetings: a local experience

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Aim: To audit the proportion of images available for radiological review prior to a Cancer Multidisciplinary Team Meeting (MDTM). The RCR guidelines published in 'Cancer Multidisciplinary Team Meeting—Standards for Clinical Radiologists' were used as the standard. These state that there should be prior review of all images by an individual with appropriate expertise and with sufficient time to provide an unhurried professional opinion for the MDTM.

Methods: Chest and haematology MDTMs were attended over a 4 month period and the number and types of cases on which an immediate opinion was requested were recorded.

Results: In total 316 patients were discussed. At only three meetings (out of 23) were all images available for prior review. Ninety seven patients' images were brought to the MDTMs for an immediate opinion over the study period. Sixteen of these patients were new additions to the circulated MDTM list whilst the remaining 81 were patients with foreign films or local hard copy only examinations. Over two-thirds of the images on which an immediate opinion was requested were cross-sectional examinations where there were also frequently old images for comparison. The remaining modalities were plain films, ultrasound and nuclear medicine. An opinion was offered on all of these images.

Conclusion: Our results fell short of the recommended 100% of images that should be reviewed prior to a Cancer MDTM (at 69%) potentially to the detriment of patient care. The introduction of PACS should improve our ability to preview images as most problems arose due to unavailability of images.

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23. An African Cancer Organisation and a method for sharing radiological images and expertise transcontinentally

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Radiology departments in many parts of Africa cannot afford to purchase expensive PACS systems. One of us (BAS) is a South African Radiologist currently working in the UK but involved in the African Organisation for Research and Training in Cancer (AORTIC) whose aim is to promote cancer awareness throughout Africa. BAS hopes to make a meaningful radiological contribution to AORTIC by organising the equivalent of UK cancer MDT meetings between different African countries and centres as well as involving the expertise of appropriate radiological colleagues worldwide. Consequently BAS has been involved with the other co-authors of this abstract in trialling 'disect'—an inexpensive PC based 3-D DICOM viewing system (http://www.disectsystems.com). The results of these trials in a number of UK non-PACS hospitals have been presented elsewhere. Disect has powerful networking capabilities that allow users at two different locations, each running the disect software and with the same DICOM file installed, to review and interact with that particular case simultaneously, with connection provided by local area networks and/or the internet. We feel this has considerable potential for specialist centres throughout Africa, or indeed any other parts of the world that wish to link up and share expertise. The purpose of this abstract is to draw members of the ICIS's attention to (a) the existence of AORTIC and (b) the future possibilities of joint radiological teaching and research projects with African nations.

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24. Audit of cancer imaging in Lagos, Nigeria

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The effective management of patients with cancer requires a multidisciplinary team approach with the diagnostic radiologist playing an extremely important role. Through the arsenal of imaging modalities available, the radiologist detects and elucidates the significance of the findings in any investigation, be it for the purposes of screening, diagnosis, staging, treatment planning, evaluation of response to therapy and follow-up of each disease site in the cancer patient and supporting clinical trials of new therapeutic agents. The extent to which these several roles of medical imaging facilities are put to use in the management of cancer, in view of the paucity of imaging modalities in this environment has not been evaluated. This study was designed to evaluate the degree of awareness of medical practitioners of the several roles of medical imaging in the management of cancer in Lagos, Nigeria, and evaluate the extent to which medical imaging facilities are being effectively used in the management of cancer in Lagos, Nigeria. All the requests forms for cancer patients seen in the six busiest radiology departments in Lagos, during the period January 2003 to December 2003 were reviewed. The radiologic investigative modality requested, the indications for the investigation and the referring clinicians' specialties were noted. The percentages of requests made for the various purposes listed above were evaluated. We concluded that medical imaging is grossly underutilized in the management of cancer in this environment, the largest requests for medical imaging being for diagnostic and staging purposes.

Ear, nose and throat/central nervous system

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25. Tumours of the globe and orbit: a pictorial review of the spectrum of disease

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Purpose: To present the imaging findings of tumours of the globe and orbit accompanied by a description of the most appropriate imaging modality in aid of establishing a diagnosis.
Background: Radiological imaging of tumours of the globe and orbit provides valuable additional information to the clinical history and examination in diagnosing the type of tumour. There is a wide spectrum of tumours of the globe and orbit given their small confines. Currently, the commonest imaging modalities used are computed tomography (CT) and magnetic resonance imaging (MRI). CT is the most useful tool in the detection and localisation of these tumours. As it provides more information with regards to bony landmarks, it is vital in pre-operative planning. MRI, however, is superior in evaluating intracranial extension. Ultrasound may still be used as an adjunct in the evaluation of fluid filled tumours.
Method: The imaging findings of tumours of the globe and orbit are presented with an educational text and description of the most appropriate radiological imaging modality.
Conclusion: This pictorial review aims to familiarise the radiologists and clinicians with the imaging appearances of tumours of the globe and orbit accompanied by important features and suggestions that the clinicians could identify with in further management.

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26. Multidisciplinary approach of the role of imaging in the control of head and neck cancer patients

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Aim: To show the value of imaging in the control of head and neck cancer patients treated with chemotherapy, chemoradiation and targeted biological therapy.
Materials and methods: Sixty-one head and neck tumour patients with stage III/IV, or recurrence (48 squamous cell carcinoma, 2 adenocarcinoma, 3 anaplastic carcinoma, 5 adenoid cystic carcinoma, 2 olphactorius neuroblastoma, 1 chondrosarcoma) were evaluated. The sites of origins were: 8 sinonasal, 10 epipharynx, 11 oropharynx, 14 oral cavity, 13 hypopharynx, 2 larynx, 3 salivary gland. Thirty-nine patients were examined with magnetic resonance imaging (MRI) (1.5 T), seven with computed tomography (CT) (single detector spiral CT or multidetector CT, 16 detector rows) and 15 with both modalities. Imaging was made prior to therapeutic decision, as well as for evaluation of therapy response. After treatment, a baseline scan (1–3 months after treatment) and in general 3 monthly follow up examinations were performed. Functional MR imaging with dynamic contrast enhancement evaluation and time-signal intensity curve analysis was also performed in 16 patients.
Results: The patients were treated with combined chemotherapy (27), radiochemotherapy (34) and targeted biological therapy was given for 14 patients in a combination of chemotherapy or chemoradiation. In the observed time period (May 2004 to May 2006) 17 complete responses, 32 partial responses, and 12 cases of progressive disease were evaluated.
Conclusion: Chemotherapy, chemoradiotherapy and targeted biological therapy are promising developments in the management of advanced head and neck cancer. After the introduction of 'organ preservation' protocols the role of imaging has become more important. The use of contrast enhancement as a marker of angiogenesis can improve diagnosis. Angiogenesis results in changes in the parameters of vascular physiology and thus alters the pattern of contrast enhancement.

Positron emission tomography (PET)

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27. PET/CT artifacts

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Positron emission tomography (PET)/computed tomography (CT) imaging is subject to a great number of artifacts due to the variety of physiological and non-physiological uptake in whole body scanning using glucose as a tracer. We have analyzed 300 consecutive PET/CTs (Philips, Gemini GXL, Syntegra Petview) which were performed to evaluate cancer patients according to approved indications. Following analysis of physiological uptake and their variations, we studied artifacts in terms of frequency and impact on PET/CT interpretation emphasising the risk of misinterpretation with erroneous or doubtful images. Physiological uptake (brain, myocardium, liver–spleen, digestive and urinary tracts) are constantly visualised, whereas their variations (salivary, pulmonary hiles, mediastinum, muscles, brown fat, joints, testis, uterine mucosa, nipples, vessels, thyroid, thymus, respiratory movements) are visible in 80% of cases. Artifacts (post-therapy modifications, injections, punctures, metallic implants, indwelling catheters, scars) were seen in 20% of cases creating false positive images which were subject to error or litigious interpretation in 5% of cases. A CT performed with diagnostic quality using iodinated contrast injection (Iomeprol, Bracco) and diluted digestive opacification (Telebrix, Guerbet), solved several misinterpretation problems. In our experience iodine did not create artifacts. Thus we conclude that PET/CT imaging is very frequently hampered by artifacts and that the CT part of this dual imaging should be performed with the best possible quality in order to alleviate most interpretation problems.

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28. A pictorial review of the diagnostic pitfalls of PET-CT imaging

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Positron emission tomography (PET)-computed tomography (CT) is often perceived as the gold standard investigation for the diagnosis and staging of malignancy. Artefacts relating to poor patient preparation and scanning technique, normal physiological uptake, anatomical variants, and benign pathologic uptake can mimic disease and pose a diagnostic conundrum. We present examples of cases we have encountered in our practice, which illustrate these potential pitfalls, the recognition of which will improve the efficacy of PET-CT reporting.

Breast

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29. Medico-legal issues in breast imaging

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Aim: The purpose of our study was to highlight some of the medicolegal issues encountered in a busy symptomatic breast care clinic.

Methods: We performed a retrospective review of all breast imaging and image guided histopathological specimens over a 2-year period (2003–2005).

Results: Correlation of histopathological reports and breast imaging studies can confirm a correct BIRADS classification in the majority of patients, however in a minority the receipt of a discordant specimen prompts the radiologist to repeat imaging and/or to re-biopsy. The multi-disciplinary meeting provides a forum for discussion of all breast biopsy specimens, and imaging findings with our clinical colleagues, ensuring that all three components of the 'triple test approach' are concordant and consistent. With relevant examples, in the form of case studies, we outline some of the medicolegal issues of import to the breast radiologist and emphasise some learning points we feel may reduce the risk for both patient and physician.

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30. Pictorial review of metastatic manifestations of breast cancer in the abdomen

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Aim: Metastatic breast cancer involves commonly liver, brain and skeletal systems. Metastatic involvement of the gastrointestinal and genito-urinary tract is less frequent, but is well documented, particularly with invasive lobular cancer. We demonstrate a spectrum of abdominal imaging findings in patients with metastatic breast cancer, in order to illustrate its diverse imaging findings.

Materials and methods: A search was performed of a hospital database of 748 breast cancer patients. Sixty patients with metastatic abdominal involvement were identified and the imaging files of these patients were reviewed.

Results: Imaging of the cohort of patients revealed metastatic disease in commonly recognised sites in the abdomen, including, liver, peritoneum and ovary. Less frequently encountered sites of abdominal breast metastases including rectum, large intestine, stoma and endometrium were also identified. Images of typical and less common sites of metastatic spread are illustrated and the findings are discussed.

Conclusion: Metastatic breast cancer can present with a myriad of abdominal visceral involvement. The illustrated cases emphasise the necessity to consider metastatic disease when patients with breast cancer present with abdominal symptoms or imaging findings.

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31. PET/CT in breast cancer management: the Royal Marsden experience

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The demand for functional imaging in the staging and management of breast cancer is increasing. We aimed to identify the areas where positron emission tomography (PET)/computed tomography (CT) has been most beneficial in defining disease in patients with breast cancer at our unit, and the impact of these findings on the clinical management of these patients. Fifty consecutive patients with breast cancer referred to our department for a PET/CT examination between March 2004 and April 2006 were retrospectively assessed. PET/CT imaging findings were subsequently compared to follow up clinical, PET/CT and other imaging data to clarify disease sites. PET/CT confirmed the findings obtained on conventional imaging without demonstrating new findings in 32 patients. PET/CT demonstrated new areas of occult disease in 18 patients. Bone disease and locoregional adenopathy were the commonest sites. A true negative PET/CT examination occurred in 10 patients, and specific equivocal findings from other examinations were negative in 7 patients. Significant equivocal new PET/CT findings necessitating a further radiological examination, biopsy or clinical follow up to subsequently exclude disease were identified in 5 patients. Management changes made subsequent to the PET/CT examination findings occurred in 24 patients and included change from surgical management to systemic medical treatment and changes to the radiotherapy fields. In conclusion, PET/CT is an excellent modality at identifying/restaging (occult) metastatic disease in patients with breast cancer, especially at bony (lytic) and lymph node sites, with consequent patient management change.

Chest

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32. Lung lesion doubling times: variability based on method of volume determination

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Aim: Most currently published data regarding lung neoplasm doubling times (DTs) are based on gross measurements from conventional radiographs. The aim of our study was to determine and compare more precise DTs and growth rates (GRs) of lung lesions, based on volumetric measurements from thin section computed tomography (CT) imaging. Also, we aimed to determine if DTs differed significantly when compared by tissue diagnosis or measurement technique.

Methods: Institutional patient databases were searched to identify previously untreated patients with > two thin section CT scans showing a growing lung lesion, for which subsequent tissue diagnosis was obtained. Lesion volumes were derived using semi-automated computer techniques with either (1) direct volume measurement or volume calculation based on (2) lesion area or (3) lesion diameter. Volumes were calculated via methods (2) and (3) by modeling each nodule as a sphere, using the single axial CT image showing the largest area.

Results: Of 46 nodules evaluated, the diagnoses were: 8 benign, 7 metastatic, 3 lymphomas, and 28 primary lung malignancies (15 adenocarcinomas, 8 squamous carcinomas, and 5 miscellaneous). Mean DTs ranged from 49 to 146 days. There were no significant differences in GRs among the different histologies ($p = 0.43$, F-test). There was considerable variability among GRs using different volume determination methods ($R^2 = 0.61$–0.71, Pearson's correlation).

Conclusions: Lesions of different histology showed great overlap in GRs. Different types of volume determination methods gave considerably different results; therefore GR comparisons should be made using similar volume measurement methods.

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33. PET scan: utility in lung carcinoma

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Positron emission tomography (PET) is increasingly used in the evaluation of lung cancer patients. It is used to assess nodal involvement and distant metastases prior to surgery. It is also used in the investigation of solitary pulmonary nodules and other focal lung lesions. The recent guidelines published by the National Institute for Health and Clinical Excellence (NICE) state that all potential surgical patients should have a [^{18}F]fluorodeoxy glucose (FDG) PET scan prior to surgery, and all patients planned for radical radiotherapy should also have a PET scan to assess whether there are any distant metastases. In this exhibit we would like to describe our experience in the evaluation of 50 patients with lung cancer where we analysed the PET scan reports and correlated with the CT scan findings and decided whether each was either upstaged, down staged or had no change from CT. We discuss the role of PET in the management of lung cancer patients and present illustrative cases.

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34. The varied manifestations and appearances of malignant pleural mesothelioma on CT

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Aim: Malignant pleural mesothelioma (MPM) is an increasingly prevalent tumour. It is expected to reach its peak incidence over the next 10–20 years. Our review will retrospectively describe the patterns of disease and assess the distribution of frequently associated features on computed tomography in 40 histologically confirmed MPM.

Content organization: For each tumour we document: (1) type of pleural thickening and classify it into thin, thick, diffuse or lobular; (2) we measure maximum thickness of MPM at presentation; (3) presence of pleural effusions recorded as small, moderate or large; (4) ipsilateral lung infiltration; (5) contralateral lung involvement; (6) frequency of plaques and calcification, indicative of previous asbestos exposure; (7) frequency of bone erosion; (8) frequency of extra-thoracic disease including liver, adrenals and other viscera.

Conclusion/Summary: We show the spectrum of disease in MPM and emphasise the patterns most frequently associated with MPM. Data are provided on the frequency of CT features, not previously performed.
